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Note on Observations of Venus in 1897 (January to April) *at Mr. Crossley's Observatory, Bermerside, Halifax.* By Joseph Gledhill.

Venus was carefully examined on every clear day, always long before sunset, and a list of the many markings, &c., which have been seen by observers, on the terminator near the poles and on the general surface of this planet, was prepared. It was, therefore, somewhat distressing to have to confess day by day that none of these projections, &c., on the terminator, dark or bright areas on the general surface, bright polar caps, &c., were ever seen with certainty, although the new glass gave an image of wonderful purity and sharpness. It ought, perhaps, to be said that on no occasion was the steadiness of the image at all what could have been desired.

The following notes will show the nature of the impressions actually received when the planet was examined under fairly good conditions :—

1897 January 26. 3 P.M. Cloudless sky; much motion. The full limb is brightest in the *n p* quadrant, and this brightness extends into the *s p* quadrant a good way. Terminator convex. The S. cusp is not like the N. ; it has a kind of hook or projection, while the N. cusp is flattened. The contrast between the bright portion of the full limb and the rest of the surface is very marked. The peculiar form at the S. cusp has been noticed several times lately. 4 P.M. The brightest part of the full limb is about the middle of the *n p* quadrant. The interior of the disc is much less bright than the terminator or the full limb.

January 27. 3 P.M. Cloudless. The full limb is very bright; brightest in *n p* quadrant, about the middle of it.

February 7. 4 and 5 P.M., just before and soon after sunset. The full limb is brightest in the *n p* quadrant. At the S. cusp there is a small rounded form or boss.

Observations of the Physical Features of Mars, made at Mr. Crossley's Observatory, Bermerside, Halifax, during the Opposition 1896–97. By Joseph Gledhill.

These observations were made with the 9-inch triple object glass mentioned in the following paper on *Jupiter*.

1896 December 19. $\lambda = 127$. The planet was carefully examined, but the only features that could be distinctly seen and identified were a broad dark band surrounding the S. pole ending in a darker point or apex ; the faint circular patch to the W.,

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Terby Sea no doubt ; and a faint, narrow, dusky curve sweeping round the E. side of Terby Sea at a distance from it about its own diameter away. This was probably Bessel Lake and Copernicus Land combined.

December 28. λ=344°. The *p* limb very bright ; the *f* limb not nearly so bright. A dusky area not far from the S. pole was badly seen ; also what was probably Knobel Sea in the *n p* quadrant.

1897 January 1. λ=7°. A dusky, broad area or band lay to the N. of the S. pole and extended to nearly the centre of the disc (Herschel II. Strait, &c.), and having the three horn-like and curved projections at its N. edge just to the W. of the centre ; these are Dawes' Forked Bay and Burton Bay. Near the *f* limb lay Knobel Sea ; and, a mere faint speck, Lassell Sea in the *n p* quadrant, not far from the limb. The *p* limb was not so bright, but still much brighter than the *f* limb. The S. limb was the brightest portion. The three bays were the darkest markings on the disc and were quite conspicuous.

January 2. λ=344°. The W. limb was not very bright, but much brighter than the E. or *f* limb. The S. portion of the Kaiser Sea could be seen quite up to the W. limb.

January 13. λ=279°. The one conspicuous feature was the N. portion of the Kaiser Sea. The region round the S. pole was bright (Lockyer Land, &c.). A soft warm colour lay over the regions E. and W. of the Kaiser Sea ; and a narrow dusky curve was seen round the N. pole, which was perhaps Delambre Sea. When λ=231° there was a soft rose colour over all except the N. polar cap and the region near the W. limb. The W. limb was much brighter than the E. A dusky patch was seen just S. of the N. polar cap, and another near the W. limb where Oudemann Sea lies. The Kaiser Sea lies near the E. limb, and there is a bright narrow strip along its W. edge. When λ=186° a dusky broad band lies across the disc to the N. of the S. pole, and there are also some faint markings to N. of it. The bright strip along the W. limb is very bright and broad, perhaps one-fourth or one-fifth of the semi-diameter. On the E. side of the disc the colour extends quite up to, or very nearly to, the limb. The W. limb is bright from pole to pole and much brighter than the E. limb. The broad band to N. of the S. pole is Maraldi Sea, &c. ; the faint markings to N. of it are Oudemann Sea, &c.

When λ=230° there was no trace of ruddy colour on the disc, power 150 ; power 240 revealed a slight warm tint. The W. limb was not much brighter than the E., and a bright division in the dark region round the S. pole can be seen ; it is probably Burckhardt Land. A bright spot is seen just to E. of Oudemann Sea, which is probably Fontana Land.

January 14. λ=188°. A broad band lies across the disc to N. of S. pole ; it is Maraldi Sea ; the polar region to the S. of it is not bright ; the W. limb is very bright, and the E. limb less so ; there is a warm tint over the central region ; in the *nf*

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quadrant Oudemann Sea is seen, and a bright circular spot just E. of it, *i.e.*, Fontana Land; Oudemann Sea was on the central meridian about 6 P.M. The warm central tint extends quite up to the E. limb, but not to the W. limb.

January 17. $\lambda = 179°$. The faint red colour does not extend up to the E. limb, and stops a good way short of the W. limb. The W. limb is brighter than the E., but not strikingly so.

$\lambda = 192°$. W. limb not at all bright; very little colour on the disc. Oudemann Sea was central about $7^h\ 35^m$.

$\lambda = 237°$. A dark narrow patch lies just S. of the N. polar cap. The Kaiser Sea is near the E. limb and is faint. In the *s p* quadrant, just under the broad band and near where the N. edge of this band touches the W. limb, there is considerable ruddy colour.

$\lambda = 267°$. The Kaiser Sea is dark; no red colour on the disc; W. limb not very bright.

January 18. $\lambda = 184°$. Central region pale red; no colour between Oudemann Sea and the E. limb; W. limb not very bright; Oudemann Sea in *nf* quadrant. When $\lambda = 198°$ red colour was seen on both sides of Oudemann Sea; W. limb very bright, much brighter than the E. limb; Oudemann Sea on the central meridian about $8^h\ 12^m$. When $\lambda = 257°$ Kaiser Sea was well away from the E. limb.

January 20. Nasmyth Inlet has not yet been seen this opposition; Lassell Sea has been well seen more than once; the dark Bessel Lake and the dark sweep to the north of it, and that to the N. of Copernicus Land, have been seen once; Trouvelot Bay has been seen several times since 1896 December. This evening, $\lambda = 193°$, the broad band to the N. of the S. pole, a faint diffuse marking between the centre and the N. pole (Oudemann Sea), and the N. polar cap are well seen. Oudemann Sea was on the central meridian about $9^h\ 20^m$. Very little ruddy colour seen on the disc.

January 21. $\lambda = 193°$. The *p* limb is not very bright, and is not much brighter than the *f* limb; very little, if any, warm colour on the disc. The region S. of Maraldi Sea is bright, and Burckhardt's Inlet is seen. A faint marking near the *p* limb is seen; it is probably Oudemann Sea.

January 22. $\lambda = 160°$. The *p* limb is very bright; the *f* limb is not bright. There is a faint marking in the *n p* quadrant. Trouvelot Bay is near the central meridian. The region S. of the great broad band S. of the centre is bright. The N. polar cap is bright.

January 23. $\lambda = 173°$. The N. polar cap is well seen; it is small, bright, and a little brighter than the *p* limb; the *f* limb is not bright. There is a rosy glow all over, the disc to the N. of the broad band between the S. pole and the centre. The region (polar) between this broad band and the S pole is nearly as bright as the central parts of the disc. There is a very bright spot on the S. limb some 20° to the W. of the point where a line through

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the N. polar cap, and the centre of the disc would cut the S. limb; it is like a bright white bead and smaller than the N. polar cap. The dark broad band to N. of S. pole is Maraldi Sea, &c. Trouvelot Bay is seen occasionally. The bright spot just named lies on the S. edge of the broad band and just where it reaches the West limb.

January 25. λ=90°. The polar region between Maraldi Sea, &c., and the S. pole is bright. The W. limb is not very bright. When λ=119° Maraldi Sea is very faint. No markings to the N. of Maraldi Sea can be seen distinctly.

January 26. λ=82°. The W. limb not very bright; no red colour on disc; brightness of W. limb extends beyond the N. pole. When λ=126° the W. limb was bright yellow, not white; E. limb not so bright; Maraldi Sea very faint; the region between it and the S. pole is bluish white. The darkest marking is just well on the disc in the *sf* quadrant (Trouvelot Bay ?). The S. polar cap is seen. When λ=140° the region near the S. pole is the brightest part; it is bluish white. Maraldi Sea and adjacent regions E. and W. are faint. The W. limb is very bright.

February 7. λ=351°. N. polar cap very bright; a faint curve is seen round the S. edge of the cap (Schrœter Land ?). Dawes' Forked Bay and Burton Bay seen as one curved horn ? Lockyer Land, very bright, in *sp* quadrant in the polar area and close to limb ? One edge of the Kaiser Sea very near the W. limb ? The *p* limb much brighter than the *f* limb.

February 9. λ=91°. The N. polar cap is well seen. The limb in the *sp* quadrant is very bright; that in the *np* quadrant less so. The S. polar region is dusky. The width of the bright strip within the W. limb is about $\frac{1}{4}$ of the semi-diameter of the disc. A dark horn on N. edge of the broad dark band was on the central meridian about $8^h\ 35^m$.

February 16. λ=286. The N. portion of the Kaiser Sea was central about $7^h\ 51^m$. The *p* limb was bright but not very bright; the *f* limb dull. The N. polar cap was well seen. Lockyer Land, near the S. pole, was bright and bluish white. A dusky curve just S. of the N. polar cap was easily seen. Nasmyth Inlet and Lassel Sea are not seen.

February 23. λ=220°. The *p* limb is very bright, and much more so than the *f* limb. The region round the S. pole is bright, and the N. polar cap is seen, but no other markings with the exception of the broad dark band to N. of the S. pole, *i.e.*, Maraldi Sea, &c.

February 27. λ=182°. The region between Maraldi Sea and the S. pole is nearly as bright as the N. polar cap. The broad, dark band (Maraldi Sea, &c.) is darkest near the *f* limb. Nothing definite can be seen in all the region between Maraldi Sea and the N. pole. The *p* limb is very bright and the brightness extends inwards $\frac{1}{4}$ or $\frac{1}{5}$ of the radius of the planet; the *f* limb is much less bright.

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March 1. $\lambda = 192°$ The *p* limb is much brighter than the *f* limb. A faint line of shading is seen on S. edge of the N. polar cap.

March 8. $\lambda = 86°$. The *p* limb is very bright, and the brightness extends inwards about $\frac{1}{5}$ of the semi-diameter of the planet. The only other marking is the dusky, broad band to N. of S. pole stretching all the way across the disc.

March 10. $\lambda = 67°$. The *p* limb is very bright and the brightness extends inwards as on the 8th. The dark band across the disc (De la Rue Ocean, &c.) is, as it nearly always is, the most prominent feature of the disc; the region between it and the S. pole is very bright. There is a dusky form near the centre of the disc; Airy Sea? And one near the *p* limb; Knobel Sea? The N. polar cap is bright and small.

March 13. $\lambda = 68°$. Knobel Sea (?) is seen as on the 10th, but not Airy Sea. The N. polar cap is bright, so is the area near the S. pole. The *p* limb is much brighter than the *f* limb.

March 16. $\lambda = 10°$. The *p* limb is bright and brighter than the *f* limb. Knobel Sea is on or near the central meridian, and is a faint, diffuse marking. The broad band to N. of the S. pole (De la Rue Ocean, &c.) is darkest near the *f* limb, and becomes pale near the *p* limb. The N. polar cap is bright. The area near the S. pole is bright.

Notes.

1896 December 19. Fair definition. December 28. Very poor seeing. 1897 January 1. Fair. January 2. Very poor. January 13. Fair; often good for a few moments. January 14. Fair. January 17. Bad. January 18. Much motion. January 20. Fair. January 21. Violent motion. January 22. Stormy; good definition between showers of snow. January 23. Fair. January 25. Bad. January 26. Bad. February 7. Poor. February 9. Poor. February 16. Fair. February 23. Stormy; bad. February 27. Poor. March 1. Poor. March 8. Poor. March 10. Fair. March 13. Bad. March 16. Fair.

Observations of Jupiter and Jupiter's Satellites made at Mr. Crossley's Observatory, Bermerside, Halifax. By Joseph Gledhill.

This paper comprises the following sub-divisions:—

(*a*) A description of the principal features seen on the disc of *Jupiter* from 1896 November to 1897 June.

(*b*) Transits of dark and bright spots.

(*c*) The red spot, &c., notes and transits.

(*d*) Measures of the position of the principal dark belts.

(*e*) Measures of the breadth of dark bands and bright zones.

(*f*) Measures of dark and bright spots, &c.

(*g*) Notes on satellites and shadows during transit across *Jupiter's* disc.

(*h*) Observations of phenomena of *Jupiter's* satellites.